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IS : 7877 (Parts I to V) - 1976

Indian Standard
METHODS OF SAMPLING
AND TESTS FOR HAND-MADE CARPETS

UDC 677.643 : 677.01



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METHODS OF SAMPLING AND TESTS FOR HAND-MADE CARPETS

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Indian Standard

METHODS OF SAMPLING AND TESTS FOR HAND-MADE CARPETS

0. FOREWORD

0.1 This Indian Standard (Parts I to V) was adopted by the Indian Standards Institution on 10 September 1976, after the draft finalized by the Textile Floor Coverings Sectional Committee had been approved by the Textile Division Council.

0.2 Assistance has been derived in the formulation of the various parts of this standard from the standards issued by the International Organization for Standardization as mentioned below:

- Part I Draft International Standard 5086 Hand-knotted carpets — Sampling and selection of areas of test
- Part II ISO 2550-1972 Hand-made carpets — Determination of types of knots
- Part III ISO 1763-1973 Carpets — Determination of number of tufts and/or loops per unit length and per unit area
- Part IV ISO 2549-1972 Hand-knotted carpets — Determination of tuft leg length above woven ground
- Part V ISO 3018-1974 Rectangular textile floor coverings — Determination of dimensions

0.3 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

*Rules for rounding off numerical values (*revised*).

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*Indian Standard***METHODS OF SAMPLING
AND TESTS FOR HAND-MADE CARPETS****PART I SAMPLING AND SELECTION OF AREAS FOR
PHYSICAL TESTS AND CHEMICAL ANALYSIS**

UDC 677·643 : 677·011 [620·113]

1. SCOPE

1.1 This standard (Part I) gives the method for sampling and selection of areas for carrying out the physical tests and chemical analysis of hand-made carpets.

2. SAMPLING

2.1 Each carpet shall be tested separately for the different characteristics.

2.2 For physical tests and chemical analysis, remove adequate quantities of yarn forming pile from the back side of the carpet from different parts by a suitable hook. For colour fastness tests adequate quantity of yarn of each colour used in the carpet shall be removed at random.

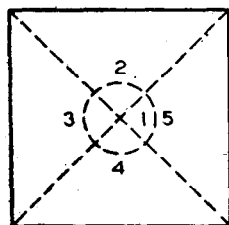
NOTE — In case of carpets having a number of colours in pile, it may not be desirable to carry out colour fastness tests on such colours which are used in small quantities because removal of such yarn might damage the design of the carpet.

2.3 The pile yarn shall be taken from different parts of the carpet in such a way as to make the sample as representative of the carpet as possible taking care that not more than one knot is removed from any one spot within an area of 10 cm² so as to avoid damage to the carpet. The samples of pile yarn shall not be removed from the carpet within 10 cm from the selvages as well as the transverse edges.

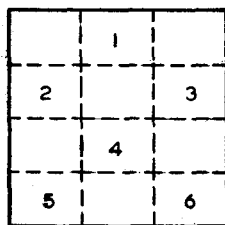
3. AREAS OF TEST

3.1 The number of measurements and areas of test (except colour fastness) shall depend on the size of the carpet as given below:

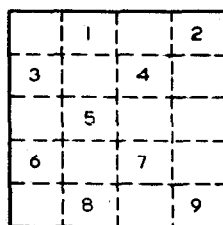
| <i>Size of the Carpet</i> | <i>Minimum Number of Measurements</i> | <i>Areas of Test</i> |
|--------------------------------------|---------------------------------------|----------------------|
| Up to and including 6 m ² | 5 | see Fig. 1A |
| Above 6 and up to 14 m ² | 6 | see Fig. 1B |
| Above 14 m ² | 9 | see Fig. 1C |



IA



IB



IC

FIG. 1 AREAS OF TEST

Indian Standard

METHODS OF SAMPLING AND TESTS FOR HAND-MADE CARPETS

PART II DETERMINATION OF TYPE OF KNOTS

UDC 677.643 : 677.017.424.3

1. SCOPE

1.1 This standard (Part II) describes five types of knots used in the manufacture of hand-made carpets and gives a visual method for their identification.

1.2 All the knots made in Indian carpets are either Persian knots or derivation of the same.

1.3 An informatory note on the five types of knots is given in Appendix A.

2. AREAS OF TEST

2.1 Select the areas of test in accordance with 3 of Part I.

3. DESCRIPTION OF TYPES OF KNOTS

3.1 Single Knots — Single knots are of two types, namely, Type I and Type II.

3.1.1 Type I (*see* Fig. 1) — For this type, the weaver:

- a) makes knots by
 - 1) looping a strand of pile yarn around a (the first) warp thread,
 - 2) passing the strand under the adjacent (the second) warp thread to the left of the first warp thread, and
 - 3) pulling up the strand and cutting it; and
- b) weaves the backing between two adjacent rows of knots by laying two (or more) weft threads, interlacing each with warp threads as in a plain weave.

NOTE — The two weft threads, one over the row of knots and the other under it, shall be inserted in the opposite sheds.

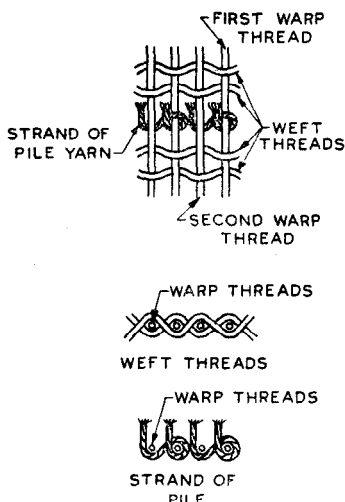


FIG. 1 TYPE I

3.1.2 Type II (see Fig. 2) — For this type, the weaver

a) makes knots by

- 1) looping a strand of pile yarn around a (the first) pair of warp threads,
- 2) passing the strand under the adjacent (the second) pair of warp threads to the left of the first pair of warp threads, and
- 3) pulling up the strand and cutting it; and

b) weaves the backing between two adjacent rows of knot by laying two (or more) weft threads, interlacing each with pairs of warp threads as in a basket weave (a weave repeating on two pairs of warp threads and two weft threads).

NOTE — The two weft threads, one over the row of knots and the under it, shall be inserted in the opposite sheds.

3.2 Double Knots — Double knots are of three types, namely, Types III, IV and V.

3.2.1 Type III (see Fig. 3) — For this type, the weaver makes knots as in Type II and weaves the backing as in Type I.

3.2.2 Type IV (see Fig. 4) — For this type, the weaver

a) makes knots by

- 1) looping a strand of pile yarn around a (the first) warp thread,

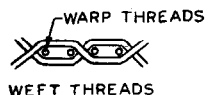
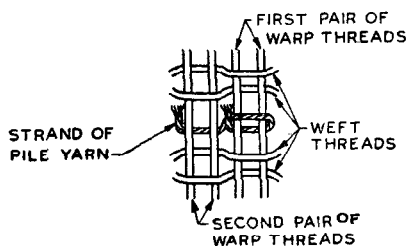


FIG. 2 TYPE II

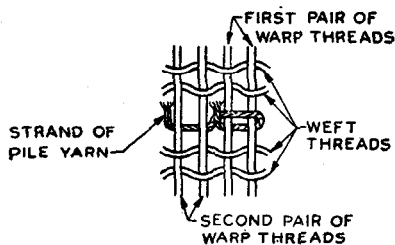


FIG. 3 TYPE III

- 2) passing the strand above the adjacent (the second) warp thread to the left of the first warp thread,
- 3) passing the strand behind the adjacent (the third) warp thread to the left of the second warp thread, and
- 4) pulling up the strand and cutting it;
- b) makes the second knot as in (a) above after leaving the adjacent (the fourth) warp thread to the left of the third warp thread; and
- c) weaves the backing as in Type I.

3.2.3 Type V (see Fig. 5) — For this type, the weaver

- a) makes some knots as in Type I and the remaining as in Type II, and
- b) weaves the backing as in Type I.

NOTE — Type V of knots is used only in figured carpets.

4. PROCEDURE FOR IDENTIFYING TYPES OF KNOTS

4.1 Bend the face of the carpet in such a way that pile formed by the two adjacent rows of tufts is pushed apart thus revealing bases of these tufts. Visually examine the knots carefully using a suitable magnifying glass, if necessary, and determine which type of knot has been used.

4.2 Similarly examine the knots in the different areas of carpet.

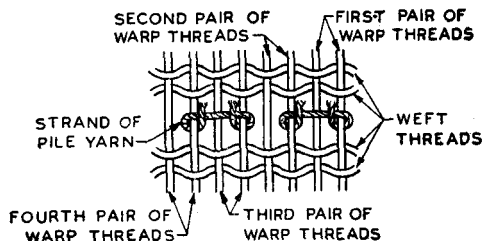


FIG. 4 TYPE IV

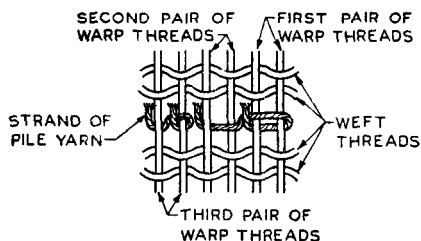


FIG. 5 TYPE V

5. REPORT

5.1 Report the type of knots identified to which the arrangement of knots corresponds and a reference to this standard.

APPENDIX A

(Clause 1.3)

INFORMATORY NOTE ON VARIOUS TYPES OF KNOTS

A-1. SINGLE KNOTS

A-1.1 Type I produces single knots. Such a knot is made on a pair of warp threads.

A-1.2 Type II also produces single knots, the only difference as compared to Type I is that this knot is made on two pairs of warp threads. The two threads work as one and both of these pass through the same heald. The use of double warp increases the strength of the fabric warpwise.

A-1.2.1 This method is adopted for producing carpets having very few, say 12 to 20 knots per decimetre widthwise. This method is also adopted in such cases where coarse warp yarn of required count might not be generally available.

A-2. DOUBLE KNOTS

A-2.0 The back of a carpet with double knots may not show the same fineness as a carpet made with single knots. The pile density of such carpets is also less as compared to carpets made with single knots.

A-2.1 Type III produces double knots. A knot is produced on four warp threads. However, the alternate warp threads are in the same shed, that is, the fabric is woven in plain weave.

A-2.2 Type IV is a variation of Type III to adjust it to coarse weave rather than fine weave.

A-2.3 Type V gives a combination of single knots and double knots. Actually the knots by Type III are never produced alone and these are always made in conjunction with single knots where the design of carpets so demands.

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*Indian Standard***METHODS OF SAMPLING
AND TESTS FOR HAND-MADE CARPETS****PART III DETERMINATION OF NUMBER OF KNOTS**

UDC 677.643 : 677.017.424.3

1. SCOPE

1.1 This standard (Part III) prescribes a method for determining the number of knots in hand-made carpets.

2. AREAS OF TEST

2.1 Select the areas of test in accordance with 3 of Part I.

3. APPARATUS

3.1 A rule or instrument capable of measuring to the nearest millimetre shall be used.

4. PROCEDURE

4.1 Take one specimen and count at the back of the carpet 40 knots and measure the distance occupied by them. If the distance is less than 10 cm, continue to count until the knots extend over at least 10 cm.

4.2 Repeat the measurement in the different areas of carpet lengthwise and widthwise.

5. CALCULATIONS

5.1 Calculate the number of knots per decimetre in lengthwise and widthwise directions using the following formula:

$$S \text{ (Lengthwise)} = \frac{100 \times \sum N_s}{\sum L_s}$$

$$G \text{ (Widthwise)} = \frac{100 \times \sum N_g}{\sum L_g}$$

where

N_s and N_g are the number of knots in each specimen, and
 L_s and L_g are the actual lengths in mm.

Measured in lengthwise and widthwise directions respectively.

5.2 Calculate the number of knots per square decimetre by multiplying the values of *S* and *G* obtained above.

6. REPORT

6.1 Report the number of knots per decimetre in warp and weft directions in the carpet as obtained in **5.1** and number of knots per square decimetre in the carpet as obtained in **5.2**.

Indian Standard
**METHODS OF SAMPLING
AND TESTS FOR HAND-MADE CARPETS**
PART IV DETERMINATION OF PILE HEIGHT

UDC 677.643:677.017.222

1. SCOPE

1.1 This standard (Part IV) prescribes a method for determination of the pile height, that is, tuft leg length above woven ground.

1.1.1 The tuft leg length above woven ground is the same as pile height when the pile is in the vertical position. Generally, the hand-knotted carpets have unidirectional pile, that is, the tufts lie at an angle to the ground opposite to the direction in which weaving has been proceeded. If the tufts are not measured in vertical position, the observations may not give correct results about the pile height rather it would give the measurement of pile thickness.

2. TERMINOLOGY

2.1 For the purpose of this standard, the pile height (tuft leg length) shall mean the length of pile from the point where it emerges from the woven ground to its free extremity.

3. PRINCIPLE

3.1 The pile height is found by inserting in the pile, at right angles to the woven ground, flat metal gauges of known height and determining which gauge corresponds to the pile height.

4. AREAS OF TEST

4.1 Select the areas of test in accordance with 3 of Part I.

5. APPARATUS

5.1 Gauges made of flat metal strips of shape as shown in Fig. 1, available in intervals of 1 mm shall be used.

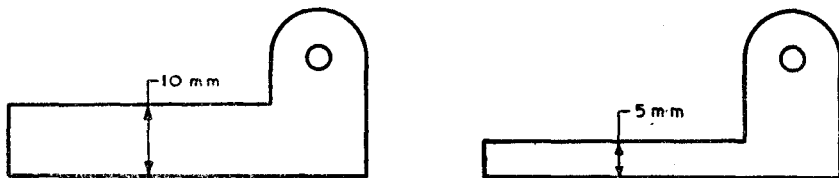


FIG. 1 GAUGES

6. PROCEDURE

6.1 Insert a gauge between two rows of pile (tuft legs) ensuring that the firm contact is made with the woven ground. Select for measurement the row of pile lying adjacent to the gauge but towards the end of the carpet last woven. Stroke the pile into vertical position besides the gauge thus giving necessary support to the pile to keep them into vertical position. By successively using different gauges, select the gauge that corresponds to the pile height. Check that this is the nearest gauge by inserting in the same position gauges a unit higher and lower than selected. Determine the pile height to the nearest millimetre.

6.2 If the carpet, due to its design, contains pile of different heights, determine the pile height at all level portions.

6.3 Repeat the measurement in the different areas of carpet.

7. REPORT

7.1 Calculate the average pile height and report the same to the nearest millimetre.

Indian Standard

METHODS OF SAMPLING AND TESTS FOR HAND-MADE CARPETS

PART V DETERMINATION OF DIMENSIONS

UDC 677.643:677.017.2

1. SCOPE

1.1 This standard (Part V) prescribes a method for determination of length, width and diagonals of rectangular and square carpets, diameter in case of circular carpets and major and minor axes in case of oval-shaped carpets.

2. APPARATUS

2.1 A rule or instrument capable of measuring accurately to the nearest millimetre shall be used.

3. PROCEDURE

3.0 General Instructions — Spread the carpet on a smooth flat surface taking care that no wrinkles are present. Make the measurements between the outer edges of the base of the pile on the opposite edges of the carpet. Make all the measurements to the nearest millimetre.

3.1 Rectangular and Square Carpets

3.1.1 Length — Make the measurement in the warp direction in such a way that two measurements are made at an approximately 10 cm within each selvedge of the carpet and one approximately in the middle. Calculate the average length to the nearest 5 mm for carpet measuring up to 100 cm and to the nearest 10 mm for larger carpets.

3.1.2 Width — Make five measurements in the weft direction in such a way that two measurements are made at an approximately 10 cm within each edge of the carpet and three measurements made at distances approximately $L/4$, $L/2$ and $3L/4$ from one edge of the carpet (L being the length of the carpet). Calculate the average width to the nearest 5 mm for carpets measuring up to 100 cm width and to the nearest 10 mm for larger carpets.

3.1.3 Diagonals — Make the measurements along the line joining the two diagonally opposite corners of the carpet to the nearest 5 mm for carpets having diagonals up to 100 cm and to the nearest 10 mm for larger carpets.

3.2 Circular Carpets

3.2.1 Diameter — Make the measurement of the diameter of the carpet at four different points distributed along the periphery. Calculate the average of the four readings to the nearest 5 mm for carpets measuring up to 100 cm in diameter and to the nearest 10 mm for larger carpets.

NOTE — To facilitate the measurement of diameters the centre of the carpet may be determined by first folding the carpet into half and then refolding it into further half, thus making it into a quarter size. The point where the two folds cross may be taken as the centre of the carpet.

3.3 Oval-Shaped Carpets

3.3.1 Major and Minor Axes — Make the measurement of the major and minor axes of the carpet at least at two points. Calculate the average of the two readings to the nearest 5 mm for carpets measuring up to 100 cm in major or minor axes as the case may be and to the nearest 10 mm for larger carpets.

NOTE — To facilitate the measurement of major and minor axes the centre of the carpet may be determined by first folding the carpet into half along the major axis and then refolding it into further half along the minor axis thus making it into a quarter size. The point where the two folds cross may be taken as the centre of the carpet.

4. REPORT

4.1 Report the dimensions of carpets as given below:

| | |
|--------------------------------|--|
| Rectangular and square carpets | As obtained in 3.1.1, 3.1.2 and 3.1.3 |
| Circular carpets | As obtained in 3.2.1 |
| Oval-shaped carpets | As obtained in 3.3.1 |

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IS :

- 697-1963 Woollen druggets for export (*revised*)
- 2882-1964 Camel hair druggets for export
- 3184-1965 Kelim (woollen drugget) for export
- 4361-1967 Sunnhemp druggets
- 4391-1967 Hand-made sunnhemp pile carpets
- 4392-1967 Hand-made wool *Namdhars* (*first revision*)
- 5641-1973 Hand-made wool carpets (*first revision*)
- 5756-1970 Code for packaging of carpets
- 5884-1970 Tufted wool carpets
- 7877 (Parts I to V)-1976 Methods of sampling and tests for hand-made carpets
- 7878-1975 Hand-made broadloom roll carpets

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